



MINERAL INFORMATION SERVICE

Vol. 7

July 1, 1954

No. 7

MINERAL INFORMATION SERVICE is a monthly news release concerning the mineral resources and industry of CALIFORNIA, designed to inform the public of the discoveries, operations, markets, statistics, and new publications. It is distributed without cost upon request.

URANIUM

With the explosion of the Atom Bomb in 1945 and the H-Bomb several years later, the public has become well aware of the tremendous significance of these events. Most persons have been made aware, through the press and radio, that the element uranium played the chief role in the development of atomic energy, and that uranium also serves as the source raw material for power which can be directed toward the generation of electrical power.

Uranium is a metal, and like many other metals such as copper, lead, and iron, it will combine with oxygen, phosphorus, silicon, arsenic, and sulphur to form many different minerals. Some of these minerals are important as ore minerals for uranium; others, so far, have been found in small amounts and are of mineralogical significance only. In most places where uranium is found, the mineral species in which it occurs can be determined. However, uranium has been detected in some rocks in which the exact mineral carrying uranium cannot be determined. This is especially true of the uranium in certain sedimentary rocks.

Mineralogy and Geology of Uranium Deposits:

In general, uranium ore deposits occur in all major types of rock -- igneous, sedimentary, and metamorphic. In the igneous rocks, uranium ore deposits occur in hydrothermal veins which have produced uranium commercially--in disseminated bodies, and pegmatites. In sedimentary rocks uranium occurs commercially in carnotite deposits, in the phosphorites, asphaltites, and limestones; it has also been found in lacustrine-saline deposits, and in alluvial and placer deposits.

Although there are many different uranium-bearing minerals, only a few of them have ever been found in sufficient amounts to be of commercial value. Uraninite, pitchblende, and carnotite are the more important uranium minerals. Detailed information about these three minerals and other uranium-bearing minerals can be obtained from the various textbooks on mineralogy listed in the selected references.

URANINITE: Uraninite is a mixture of UO_2 and UO_3 with varying amounts of radium, lead, combined rare-earths, thorium, and helium. Radium was first discovered in this mineral and it has been shown that the radium and helium present are products of the breaking down of uranium. Crystals, which are rare, belong to the isometric system. Uraninite is usually found massive and botryoidal, but also in grains. Its luster is glassy, dull, and submetallic, its color brown to black, its streak dark green, brown, or black. It is moderately hard -- 5 to 6 on the Moh's scale-- and heavy, having a specific gravity of 8 to 10. Uraninite has been found in pegmatites and in hydrothermal veins with ore minerals of silver, lead, and copper.

PITCHBLEND: The term pitchblende is applied to the low thorium mixture of uranium oxides that occurs as vein material associated with base metal sulphides. Pitchblende has the same general composition as uraninite, but contains less than 1.5 percent combined rare-earths and thorium. It has a pitch-like luster and will not fluoresce; its specific gravity, like uraninite, ranges from 8 to 10; it has an uneven to subconchoidal fracture. Pitchblende occurs as botryoidal and banded masses in sulphides and quartz, and as extremely fine-powder intimately associated with other minerals especially copper sulphides and hydrocarbons.

CARNOTITE: Carnotite is a yellow, hydrous, potassium-uranium vanadate whose theoretical formula is $K_2O \cdot 2UO_3 \cdot V_2O_5$. It is usually earthy, but the crystals have a pearly luster. Carnotite crystallizes in the orthorhombic crystal system, has a perfect basal (001) cleavage, and is found in scaly aggregates, incrustations, or as a crystalline powder. Carnotite commonly occurs as a yellow powdery incrustation in loosely cohering masses or as a cementing agent in sandstones, in many places associated with fossil logs and bones in Colorado Plateau ores. Other associates are malachite, azurite, biotite, and magnetite; less common associates are secondary minerals such as tuyuyamunite and uvanite.